

C L A I M S

1. A method for manufacturing printing paper or paperboard with a grammage of 30-200 g/m² in a paper or paperboard machine, comprising a wet section, a press section and a drying section, in which method a web (W), formed in the wet section, is pressed in a roll press with a double-felted roll-press nip and, thereafter, in a shoe press with an extended single or double-felted shoe-press nip, characterized in that

- the web (W) is pressed in a deflection-compensating roll press, having said double-felted roll-press nip and open press rolls,

- the machine is operated at a web speed of at least 1,200 m/min.,

- the web in said roll-press nip is subjected to a linear load ranging from 100 to 300 kN/m, preferably from 120 to 250 kN/m, and a specific pressure ranging from 5 to 15 MPa, preferably from 8 to 11 MPa,

- the web in said shoe-press nip is subjected to a linear load ranging from 500 to 1,500 kN/m, preferably from 700 to 1,200 kN/m, and a specific pressure ranging from 4 to 13 MPa, preferably from 4 to 8 MPa,

- to obtain a dewatered web with a dry-solids content of at least 35 per cent, preferably at least 38 per cent, after the roll-press nip and at least 45 per cent after the shoe-press nip.

2. A method as claimed in claim 1, characterized in that the web (W), after the roll-press nip, is brought to adhere to the press felt (15 or 13) acting as a transfer felt in the roll press with the aid of a suction roll (6) and/or one or several blowing boxes that generate partial vacuum or suction boxes (17).

3. A method as claimed in claim 1, characterized in that the web (W), after the shoe-press nip, which is

double-felted, is brought to adhere to the press felt (26 or 22) acting as a transfer felt in the shoe press (10) with the aid of a suction roll (28, 30) and/or one or several blowing boxes that generate partial vacuum or suction boxes (29, 31).

4. A method as claimed in claim 1, characterized in that the web (W), after the shoe-press nip, which is single-felted, is brought to adhere to the press clothing (26) acting as a transfer belt (26b) with the aid of its smooth web-contacting surface.

5. A method as claimed in any one of claims 1-4, characterized in that the web (W), having been transferred from the roll press (9) to the shoe press (10), is brought to adhere to the press felt (22) acting as the felt carrying the web in the shoe press with the assistance of blowing boxes that generate partial vacuum or suction boxes (25), arranged in the loop of the last-mentioned press felt (22).

6. A method as claimed in any one of claims 1-5, characterized in that the web (W) is transferred from the roll press (9) to the shoe press (10) with the aid of a pick-up suction roll (24), arranged in the loop of the press felt (22) of the shoe press (10), which press felt (22) carries the web (W) to the shoe-press nip.

7. A method as claimed in claim 2, characterized in that the web (W) is conveyed to the shoe-press nip enclosed between the first and second press clothings (22, 26) in a sandwich construction.

8. A method as claimed in claim 1 or 2, characterized in that the web (W) is conveyed from the roll-press nip enclosed between the upper and lower press felts (13, 15) in a sandwich construction.

9. A method as claimed in claim 1, 4, 5 or 6, characterized in that the web (W) is conveyed from the roll-press nip to the shoe-press nip enclosed between the upper and lower press felts (13, 15) in a first sandwich construction and, following a closed draw between the roll press and the shoe press, thereafter enclosed between the first and second press clothings (22, 26) of the shoe press (10) in a second sandwich construction.

10. A method as claimed in any one of claims 1-9, characterized in that the web (W) is pressed in the deflection-compensating roll press, the rolls of which each have a water-receiving capacity of $0.7-1.8 \text{ dm}^3/\text{m}^2$ of envelope surface.

11. A paper or paperboard machine for manufacturing printing paper or paperboard at high speed, which printing paper or paperboard has a grammage of $30-200 \text{ g/m}^2$, comprising a wet section (1), a press section (2) and a drying section (3), which press section includes a roll press, having a double-felted roll-press nip, and a shoe press, having an extended single or double-felted shoe-press nip, characterized in that the roll press has open press rolls with deflection-compensating, rotatably journalled envelope surfaces and in that the machine is arranged to be operated at a web speed of at least $1,200 \text{ m/min.}$, with a linear load in the roll-press nip ranging from 100 to 300 kN/m , preferably from 120 to 250 kN/m , and in the shoe-press nip ranging from 500 to $1,500 \text{ kN/m}$, preferably from 700 to $1,200 \text{ kN/m}$, and with a specific pressure in the roll-press nip ranging from 5 to 15 MPa, preferably from 8 to 11 MPa, and in the shoe-press nip ranging from 4 to 13 MPa, preferably from 4 to 8 MPa, to obtain a dewatered web with a dry-solids content of at least 35 per cent, preferably at least 38 per cent, after the

roll-press nip and at least 45 per cent after the shoe-press nip.

5 12. A machine as claimed in claim 11, characterized in that a suction roll (6) and/or one or several blowing boxes that generate partial vacuum or suction boxes (17) are arranged after the roll-press nip in the loop of the press felt (15 or 13) acting as a transfer felt in the roll press (9).

10 13. A machine as claimed in claim 11, characterized in that a suction roll (28, 30) and/or one or several blowing boxes that generate partial vacuum or suction boxes (29, 31) are arranged after the shoe-press nip, 15 which is double-felted, in the loop of the press felt (26 or 22) acting as a transfer felt in the shoe press (10).

20 14. A machine as claimed in claim 11, characterized in that one of the press clothings (26) of the shoe press (10) is an impermeable transfer belt (26b), having a smooth surface, to which the web (W) adheres after the shoe-press nip.

25 15. A machine as claimed in any one of claims 11-14, characterized in that blowing boxes (25) that generate partial vacuum are arranged in the loop of the press felt (22) arranged to carry the web (W) in the shoe press (10) from the roll press (9) to the shoe-press nip.

30 16. A machine as claimed in any one of claims 11-15, characterized in that a pick-up suction roll (24) is arranged in the shoe press (10) in the loop of the press felt (22) arranged to carry the web (W) to the shoe-press nip, which pick-up suction roll (24) is arranged with its 35 press felt (22) to co-operate with the press felt (15 or

13) acting as a transfer felt in the roll press to transfer the web (W) to said press felt (22).

5 17. A machine as claimed in claim 12, characterized in that the first and second press clothings (22, 26) of the shoe press (10) are arranged to run in contact with each other before the shoe-press nip, whilst enclosing the web (W) between them, to form a sandwich construction up until the shoe-press nip.

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15 18. A machine as claimed in claim 11 or 12, characterized in that the upper and lower press felts (13, 15) of the roll press (9) are arranged to run in contact with each other from the roll-press nip, whilst enclosing the web (W) between them, to form a sandwich construction up until a suction roll (6, 47) arranged in the loop of the web-carrying press felt (15 or 13, respectively).

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25 19. A machine as claimed in claim 11, 14, 15 or 16, characterized in that the upper and lower press felts (13, 15) of the roll press (9) are arranged to run in contact with each other, whilst enclosing the web (W) between them, to form a first sandwich construction up until a suction roll (47) arranged in the loop of the press felt (13) carrying the web, and in that the first and second press clothings (22, 26) of the shoe press (10) are arranged to run in contact with each other before the shoe-press nip, whilst enclosing the web (W) between them, to form a second sandwich construction up until the shoe-press nip.

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35 20. A machine as claimed in any one of claims 11-19, characterized in that the open press rolls (11, 12) each have an envelope surface (42) of steel with holes or grooves for receiving water, that together have a volume per square metre of envelope surface of 0.7-1.8 dm³.

21. A machine as claimed in claim 20, characterized in that the groove or hole volume is about $1.1 \text{ dm}^3/\text{m}^2$ of envelope surface.

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22. A machine as claimed in claim 21, characterized in that the press roll (11, 12) is grooved, the grooves having a width of about 0.5 mm and a depth of about 5 mm, the cc distance between two adjacent grooves being about 2.25 mm.

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23. A machine as claimed in any one of claims 14-22, characterized in that the impermeable transfer belt (26b) is arranged as a lower press clothing in the shoe press (10).

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